AMATEUR RADIO

NOVEMBER 1945

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

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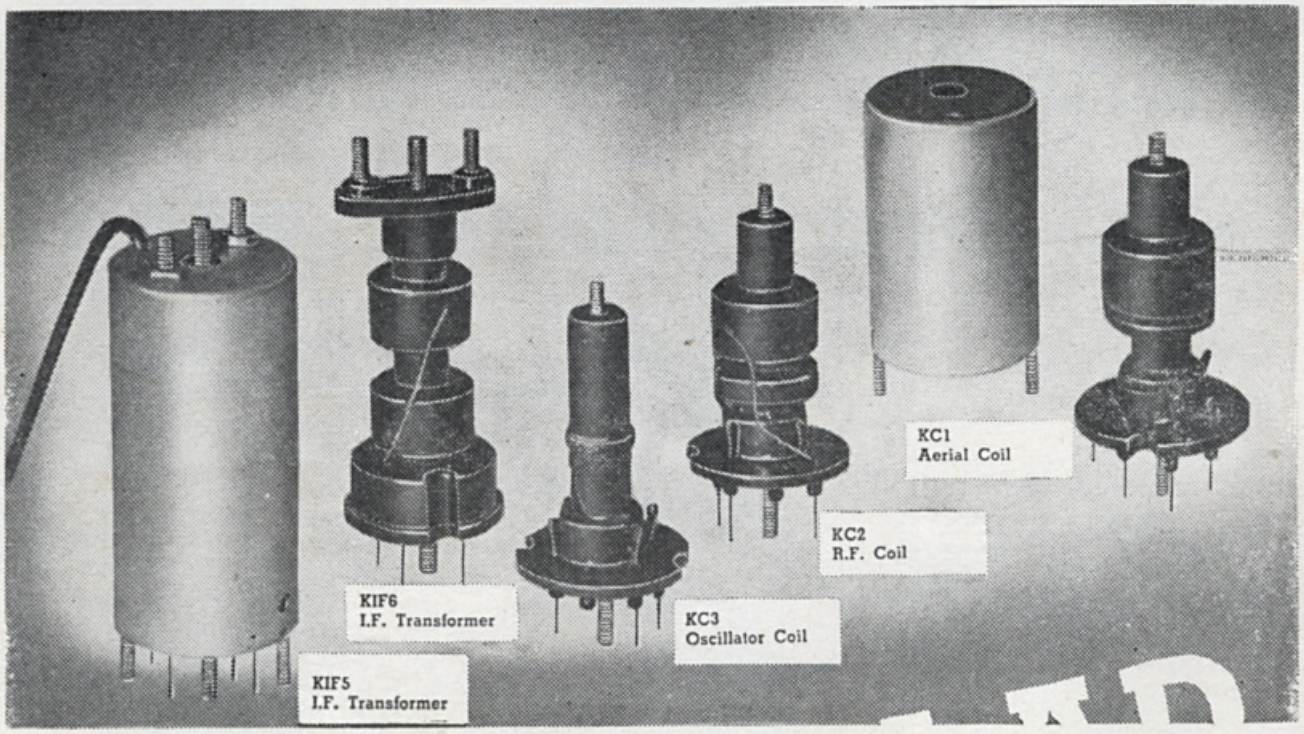

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AMATEUR RADIO

INCORPORATING THE N.S.W. DIVISIONAL BULLETIN

VOL. 13 NOVEMBER, 1945 No. 11

Published by
THE WIRELESS INSTITUTE OF AUSTRALIA
191 Queen St., Melbourne, C.1.

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20 Queen St., Melbourne, C.1.

Printers:
H. Hearne & Co. Pty. Ltd.
285 Latrobe St., Melbourne, C.1.

Mss. and Magazine Correspondence should be forwarded to the Editor, "Amateur Radio," Box 2611 W G.P.O., Melbourne, C.1. on or before the 18th of each month.

Subscription rate is 6/- per annum in advance (post paid).

Editorial

The official notification of the release of gear, held by the P.M.G. in custody since 1942, has been welcomed by Hams throughout Australia. Even more welcome, accompanying the official notification of the release of gear, was the application form for the re-issue of Experimental Licences; a fact which brings the day when we may resume experimental transmissions nearer.

By the time that this magazine reaches you the regulations governing Amateurs will be, in all probability, gazetted.

This does not authorise any Ham to immediately commence transmissions, or does it authorise him to start building his much thought about Ham station.

Amateurs must wait until their Experimental Licence is issued to them before commencing transmissions... It is confidently hoped that these licences will be issued shortly after the gazettal of the regulations.

No doubt many who have been listening on the Ham bands are wondering why some VK signals have been heard. These transmissions are entirely unauthorised, and are causing considerable embarrassment to Federal Headquarters and to Executive Officers of the Divisions.

Your old call sign is safe, so be patient and wait until your new Licence is issued—it won't be long.

IN THIS ISSUE

The Design of Compressed High Frequency Beams

By H. K. LOVE, VK3KU*

IN pre-war days the rotary beam was proving a very effective means of getting places. Hams living in built-up areas were unfortunately precluded from erecting a really efficient beam. This article by VK3KU goes to considerable length to describe methods whereby the effective length of the elements can be considerably reduced without loss of efficiency. The information herein should prove of much value to 14MC DX men.

During the immediate pre-war years 1938-39, the writer commenced some work on a rotable beam for 14 Mc. which would have less overall dimensions than the 33 ft. structure we had become accustomed to.

Any type of multi element radiator reaching dimensions in excess of 30 ft. becomes a rather expensive arrangement if it is to be safe, and completely free from liability from the neighbour when situated in congested suburban areas.

My original work centred round the idea of folding down the ends and while some very successful results may be expected from this arrangement, it is still a cumberson and heavy assembly.

In the latter part of 1939, experiments were begun with elements comprising tubes 9 ft. in length, to which were added at each end, coils calculated to make up the full electrical length.

Some success atended this attempt, but the work did not proceed long enough to bring the matter to any satisfactory conclusion. The elements were very critical to tune and indicated that capacity in some form would be necessary to construct a stable and satisfactory radiator.

The partial results of this experiment suggested that an easier way to compress a beam, might be to use inductance at the centre of the elements.

At this point my work was interrupted by the more pressing need for equipment designed required for our Armed Forces.

It was, however, of major interest to me to receive a copy of Wireless World of November, 1940, in which I read of some very excellent work carried out by Mr. E. L. Gardiner, B.S.C., under the heading of "Compressed Dipoles."

To some of our readers, 1940 seems a long time ago after what has happened in the meantime, and I am sure the Editor of Wireless World and Mr. Gardiner will forgive me if I extract from this article for the information of readers of the W.I.A. Magazine. I should like it to be understood that the very able exposition of the work on "Compressed Dipoles" is entirely credited to Mr. Gardiner and W.W.

I believe the work described by Mr. Gardiner can form a basis for early post-war investigation by the Australian Amateur of the possibilities of the reduction of the physical dimensions of Short Wave Aerials.

Mr. Gardiner writes: "For shorter wave lengths in the neighbourhood of five to seven metres, it fortunately becomes practicable to construct the dipole and reflector of metal tubing, which can be strong enough to support its own weight in a high wind. Even at these short wave lengths, however, there will be occasions when a reduction in bulk would be very acceptable. Experiments in direction finding may be quoted as an example. Just before the war the writer constructed a dipole and reflector supported by a light wooden framework which could easily be transported by car. This was employed in the field to locate a hidden five-metre transmitter. The latter radiated vertically polarised waves, and the procedure was to rotate the receiving aerial system until signals were at minimum, when the reflector will be in the direction of the incoming waves.

In this way it was found possible to determine direction with an accuracy of about five degrees, provided, of course, that the direction of arrival of the waves had not been modified by intervening objects.

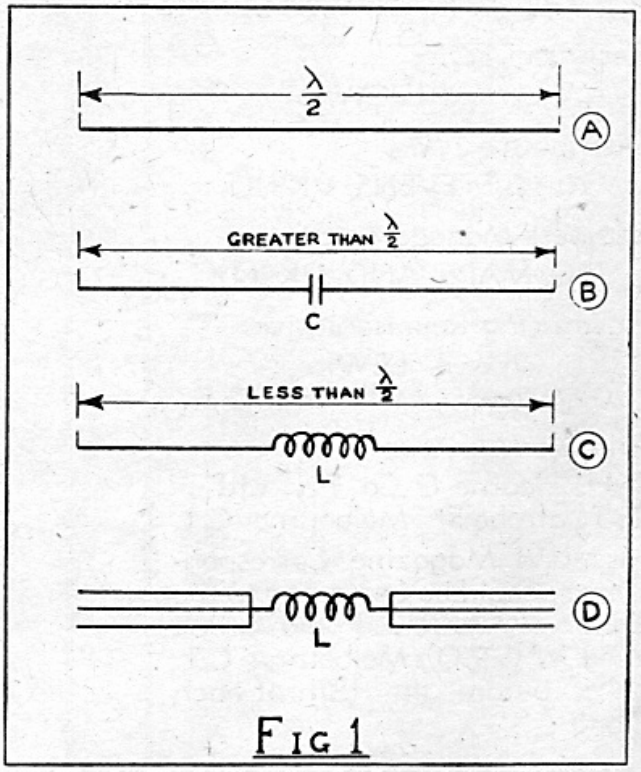


Fig. 1—Illustrating the loading of a halfwave dipole (diagram (a) by capacity and inductance.

The aerial structure was 8 feet high and 4 feet wide, and could be fairly easily handled when mounted upon a stout camera tripod fitted with a rotating head. It could hardly be termed convenient, however, and too much time was needed in setting it up, so that the need for a more compact arrangement giving, if possible, more pronounced directional effects was very evident.

Consideration of the possibilities of such an improvement naturally directed attention to the compressed dipole. This form of aerial has been known for many years, and is used by certain commercial organisations as a television receiving aerial in locations where space is very limited. It is barely mentioned, however, in most handbooks, and very little information seems to be available concerning its general use in short-wave reception. Thus there seemed good reason for carrying out

*Managing Director, Kingsley Radio.

practical tests on similar lines to those described in the previous article already mentioned, and in which the field strength measuring equipment could be pressed into service.

HALF-WAVE AERIAL CHARACTERISTICS.

The ordinary dipole, or more correctly the Hertzian half-wave aerial, resonates to a certain wave length by virtue of the distributed inductance and capacity of the conductor. In open space the resonant wave length is slightly more than twice the length of the dipole, which is therefore slightly less than a half-wave length long. The proximity of buildings or of other conductors increases the electrical capacity of the wire, and thus reduces the length necessary to resonate at any particular wave-length.

An interesting example of the effect was noticed by the writer when adjusting the length of a 20 metre aerial, one end of which was only a few feet above roof level, whilst the other was 20 feet higher. It was found that the lower end could be reduced in length by some two feet to restore resonance, thus making the two halves of the aerial unequal by that amount with respect to its electrical centre. Similarly, the resonant length of a dipole can be increased if the distributed capacity of the wire is reduced. This can be done in practice by the introduction of a condenser into the centre of the aerial, and shown at C in Fig. 1 (b). Since the capacity of two condnesers in series is always less than that of either alone, and the added condenser acts in series with the distributed capacity of the aerial wire, the effective value of tuning capacity is reduced. The aerial thus resonates to a shorter wave length, or must be increased in overall length to resonate at the wave length to which is responded before the condenser was inserted. It is possible to tune the aerial over a limited range by varying the capacity of the added condenser.

REDUCING AERIAL LENGTH.

As a rule, however, there is no advantage in increasing the length of a dipole, and it will be more useful to decrease it. By analogy with a tuned circuit employing a coil and condenser, the wave length will be increased, or the aerial shortened for a fixed wave length, if either its distributed capacity or inductance be increased. It is inconvenient to increase the capacity to any material extent. To do this by adding a condenser would imply connecting this between the two free ends of the dipole, and would only be possible by the addition of long leads which would modify the action of the whole system profoundly, or by bending the aerial round until the free ends are in close proximity. In either case the aerial becomes a closed loop, and whilst it will in fact resonate to a considerably longer wave length than before, it is no longer a dipole, and is not within the scope of this discussion.

It is, however, quite convenient to increase the inductance of a dipole by the addition of a coil, which can be inserted at the electrical centre as shown at L in Fig. 1 (c). This coil acts in series with the inductance of the wire, increasing the effective value, and thus increasing the resonant wave length. The distributed capacity is little changed, and the overall length of the dipole must be reduced to bring back into resonance with the original wave length. Being shorted, the aerial is termed a compresed or loaded dipole.

As the value of added inductance is increased the overall length must be reduced to maintain resonance at a particular wave length, and this shortening process can be continued until finally the dipole itself vanishes, leaving only the loaded coil which now resonates by virtue of its own self-capacity. In such an extreme case there would clearly be little radiation from or reception by the "aerial," which has become a closed circuit consisting of a small coil of wire. Some intermediate case must be investigated, and for the purpose of these tests it was decided to choose a value of loading coil which would reduce the overall length to one half of its original value, or to about a quarter wave length. The accompanying table gives an idea of the lengths and sizes of loading coil found suitable for wave lengths of from 5 to 20 m. No. 16 SWG enamelled copper wire was used throughout in constructing the aerials, and the loading coils were wound on a Trolitul former 1¼ inches in diameter, the turns being spaced by approximately the diameter of the wire. It must be appreciated, however, that whilst the figures given will form a satisfactory starting point from which to work when trying out compressed dipoles, they cannot be regarded as exact. The resonance of these aerials is noticeably sharper than that of a half-wave aerial, and for best results the length should be trimmed experimentally, since it be determined to some extent by the exact materials used, and particularly by wire diameter and turn spacing.

Approximate design data for compressed dipoles having a length of one-quarter wave length.

Wave length metres.	Approx. length of comp. dipole ft.	in.	Turns in loading coil.	80 ohm feeder turns. tapped across
5	4	0	12	2
7.0	5	6	16	3
10	8	0	22	4
20	16	0	40	6

In order to keep the conditions as simple as possible, the remainder of the dipoles were composed of straight single wires. It is possible to employ as the portions m and n of Fig. 1 (c) either conductors of larger diameter, such as copper tubes, or several spaced parallel wires joined together at the terminals of the loading coil, as sketched in Fig. 1 (d). By so doing the distributed capacity of these portions is further increased, and either the overall length or the inductance of the loading coil can be decreased somewhat. Clearly the possibilities are extensive, and for the present no attempt has been made to examine the properties of aerials which are compresed to less than a quarter wave length, or in which multiple wires are used. Probably the chief advantage of increasing the diameter of the arms m and n lies in the established fact that by so doing the "Q" of the aerial is reduced, and it resonates more broadly over a wider band of wavelengths. This may be important in the particular case of television reception, where some slight loss in image detail may result from the excessive selectivity of a compressed dipole in which a single wire composes the arms, and for which three wires in parallel spaced by about 2 inches can be recommended. A second case which might justify this procedure would be where a fairly uniform preformance over the whole of a waveband was desired, rather than the best possible performance at any one frequency.

FEEDER CONNECTIONS.

Before experimental tests can be made with a compressed dipole, it must be connected by a non-radiating feeder to the transmitter or receiver. Whilst any of the recognised types of feeder could be used, the aerial is symmetrical about its electrical centre, and therefore lends itself to a balanced twin-wire transmission line, rather than to the concentric type. Since it is particularly necesary that only the aerial shall radiate, a low-impedance line was preferred to one of a higher impedance, in which the two conductors would be spaced by several inches, because the latter is more likely to become unbalanced during the course of adjustments. A proprietary cable of 80 ohms nominal impedance was selected, having the useful property that the radiation from it was too slight to be measured by the equipment

used, even when the cable was not exactly matched to the aerial impedance.

The simplest and most widely used method of coupling is to break the dipole at its electrical centre, and, on the assumption that its impedance at this point has the theoretical value of 72 ohms, to insert a cable of about that impedance directly. This system works well in practice, but suffers from the disadvantage that if any steps are taken which change the impedance at the centre of the dipole, a mismatch to the feeder must occur. The presence of a reflector near the dipole will have the effect of lowering this impedance, and thus tends to destroy the desired correct matching between feeder and aerial.

MATCHING IMPEDANCES.

In the case of loaded dipoles a better method of coupling is fortunately available, since it would not be advisable to break the continuity of the loading coil. The feeder may be tapped across a few turns equally placed on each side of the centre of the coil, as shown in Fig 2 (a). Whatever the exact impedance of the feeder or of the aerial, it is now possible to get an exact match, for the imepdance across a portion of the loading coil will vary from zero when the two feeder wires are attached at a common central point, up to a comparatively high value when they are separated by the whole coil. At an intermediate point, therefore, an impedance equal to that of the feeder will always exist, and can be found by trial.

An alternative method exists in the form of inductive coupling between the loading coil and a coil of a few turns connected across the ends of the feeder cable, as shown in Fig. 2 (b). For the sake of completeness a method of coupling to the extended dipole of Fig. 1 (b) may be mentioned. Here the feeder is joined directly across the series condenser, as shown in Fig. 2 (c), and the capacity of the latter is selected so that its resistance matches the imepdance of the feeder. In this way an exact match to cable of any impedance is possible at one particular wave length only, but unlike most other arrangements the system will not operate satisfactorily at harmonics of this, since the reactance of the condenser will then be different.

It will be remembered that the performance of various arrangements was measured in the present case by connecting the aerial under test to a transmitter adjusted to deliver as far as possible constant power and observing the readings of a field strength meter placed at two wave lengths from the aerial. It can be safely assumed that the behaviour of the aerial under receiving conditions will be complementary to that when tested as a radiator, since the same physical factors are involved in the two cases, and provided of course that the incoming waves can be assumed to arrive from the direction in which measurements are made.

It was decided first to determine how the radiated field from a compressed dipole of the dimensions given in the table compared with that from a plain dipole. The latter was first set up, under the conditions of the preceding article, and the field strength at a point broadside to the aerial was noted. In this case the feeder was tapped directly into the centre of the dipole. A compressed dipole was then erected in the same position, and the same feeder connected across a few turns of the loading coil, as in Fig. 2 (a). This tapping was varied until the radiation from the aerial was at maximum, no change being made to the coupling of the other end of the feeder to the transmitter, or to the adjustaments of the latter, which was, of course, crystal controlled. It was noted with great surprise that the field strength from the two aerials was almost identical, whilst in the second case the feeder current and estimated current in the aerial had increased. The experiment was repeated several times, and on a number of wave lengths, with similar results. It was found that the reduction in overall length of the compresesd dipole to one half of the original was not accompanied, as had been anticipated, by a reduction in the radiated field to 50 per cent. or less of its

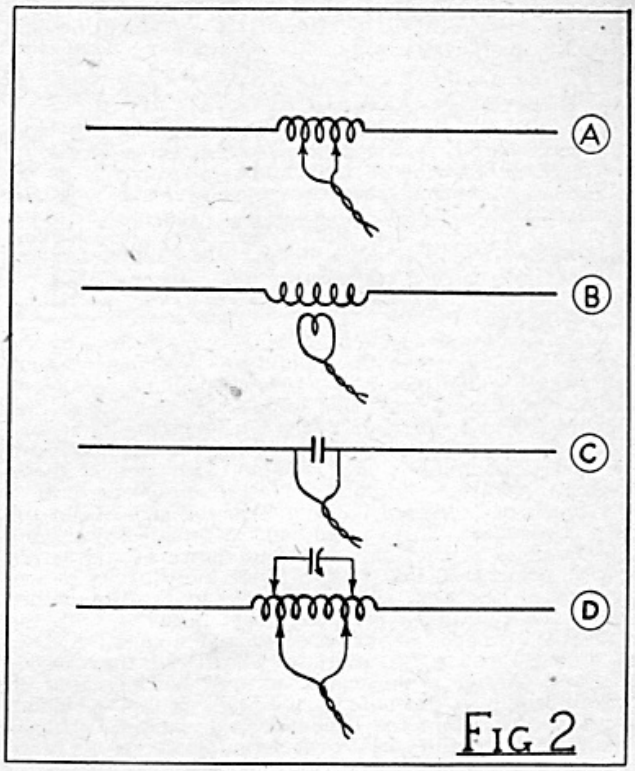


Fig 2. Methods of connecting the feeder to a loaded dipole.

former value, but that if the feeder current was maintained the same in the two cases, the field strength was reduced to between 70 per cent. and 80 per cent. only, whilst if the feeder tapping point on the loading coil was adjusted to optumum performance as first described, there was practically no reduction observed. Secondly, it was noticed that, whilst no accurate method for measuring the oscillatory current within the dipoles was available, it was clear, from the usual tests of coupling a neon tube or small lamp to the aerial wire, that both the current near the centre of the compressed dipole and the voltage of its free ends was greater.

UNEXPECTEDLY GOOD RESULTS.

It is generally asumed that the most effective portion of a dipole in radiation or reception is that near the centre, in which maximum current flows. It would therefore be expected that, if this portion be coiled up and rendered ineffective as a radiator, the radiation from the whole aerial would suffer considerably. From the evidence it seemed that this was not altogether true.

Whilst calculation of the current distribution within a loaded dipole would not be simple, it seemed likely that the following two effects were mainly responsible for the relatively good performance. First, the "Q" of the compresed dipole had been increased, as was evident from its sharper tuning ,and a given amount of power induced in it would thus be expected to set up a larger oscillatory current. The radiation resistance of the aerial was almost certainly lower than that of a plain dipole, and so there would be less damping through radiation. Secondly, it was possible to reach a very effective impedance match into the feeder by the tapping adjustment, and this would still be possible when the aerial formed part of an array, and its impedance was upset by the presence of other elements. The transfer of energy into the aerial was therefore somewhat better, and in con-

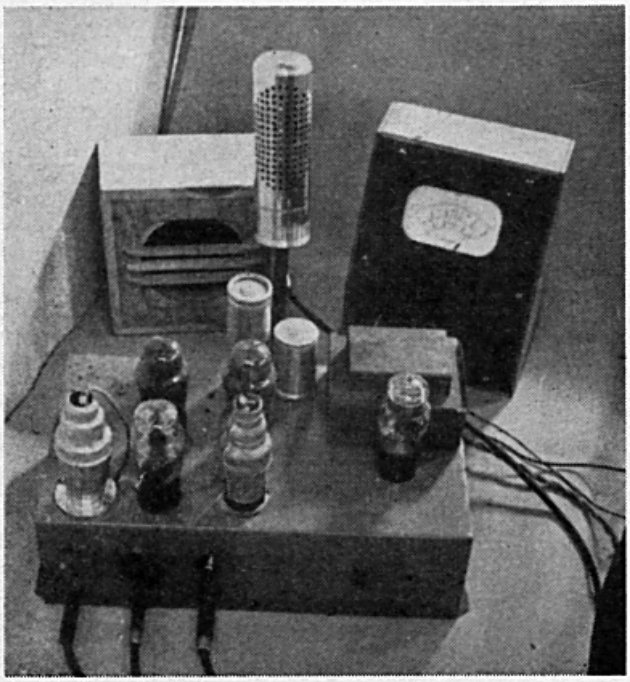
(Continued on page 20)

A RIBBON MICROPHONE

By THOMAS D. HOGAN, VK 3HX*

RECORDING enthusiasts and others interested in public address work, who are constructionally minded will no doubt be interested in the details of this Ribbon Microphone. Although the original model described here requires the use of a lathe, and other processes outside the capabilities of the home workshop, we are sure that, knowing the ingenuity of the Ham, alternative methods of construction could be employed.

As everyone knows the ideal microphone for all-round frequency characteristics, the Ribbon stands alone, and for that reason the construction of this microphone described here was undertaken. The main use to which it was to be put was in conjunction with a recording outfit owned by Mr. D. Threnoworth.



The Microphone in a typical set-up.

In search of information on the subject, an article in QST for March, 1938, described a home constructed Ribbon Microphone which used magnets which were taken from a discarded magneto. This microphone used the magnets as they were, which means that the completed article together with its associated ribbon to line transformer was some twelve inches high.

This appeared to be somewhat bulky compared with some commercially manufactured microphones. To obtain smaller magnets two methods could be used:—(1) to anneal and cut down the magneto magnets, and (2) to construct entirely new magnets.

After considering the matter at some length it was finally decided that the easiest method would be to construct entirely new magnets. I might mention here that all the constructional work was carried out by Mr. Threnoworth, ye scribe acting as technical adviser and doing the final assembling of the microphone.

*Editor "Amateur Radio."

To arrive at the length of the ribbon, which, of course, governs the lengths of the magnets, considerable research was resorted to, and several standard text books were consulted, from which one gained the information that the length of the ribbon needed to be at least 2½ inches long by ¼ inch wide. Of course, a longer ribbon would probably be more sensitive, but in this case it is offset by the desire to construct a small compact unit. In fact the completed job, together with its associated matching transformer, measures six and a half inches long.

THE MAGNETS.

The first problem in the construction of the magnets was the choice of matrial. Inquiries from one electrical firm, who do considerable constructional work, disclosed that high speed tool steel was used for the construction of permanent magnets. I've no doubt that other types of steel would be far better than "High speed."

However, as stated, high speed tool steel was used. A piece of ¾ of an inch wide by ¼ inch thick and 11 inches long was obtained. Of course, before being worked it was annealed. This was done by taking it along to a blacksmith and heating it in the forge and allowing it to cool slowly. At the same time he cut the bar into two pieces, and bent each piece to form a U with a spacing of one inch between the prongs, taking care that each U-shaped piece was a replica of each other.

The ends of the prongs are now filed, or better still ground on an emery wheel, until they are nice and square. The inside of the prongs are also filed parallel, as on this will depend the pole pieces being parallel to the edge of the ribbon.

On each prong two 3/16 inch holes are drilled. These holes are for the mounting of the pole pieces, and also serve to hold the "legs" by which the whole assembly is mounted on the base plate.

In the U portion of each piece a ⅛ inch hole is drilled through. This hole is to bolt the bracket which holds the bakelite bridge to which the ribbon is clamped at each end.

This completes the mechanical work on the magnets, it only remains now to have the two U-shaped pieces treated for hardening, after which they may be magnetised. No suggestions are offered for either the hardening process or the magnetising, as the original were done commercially.

THE POLE PIECES.

The pole pieces were cut from ¼ inch square mild steel. Each pole piece was 2¼ inches long. Along one face 1/16 inch holes were drilled through. These holes although not entirely necessary are advisable as they allow free passage of air through the microphone and so relieve pressure on the ribbon.

On one face at right angles to the face on which the 1/16 inch holes are drilled, it will be necesary to drill and tap four ¼ inch holes. These holes must correspond to the 3/16 inch holes already drilled in the prongs of the magnets. It can now be readily seen why oversize holes were drilled in the magnet prongs, as the oversize holes allow some latitude of adjustment so that the faces of the pole pieces may be adjusted until they are absolutely parallel. The ¼ inch holes in the pole pieces by the way

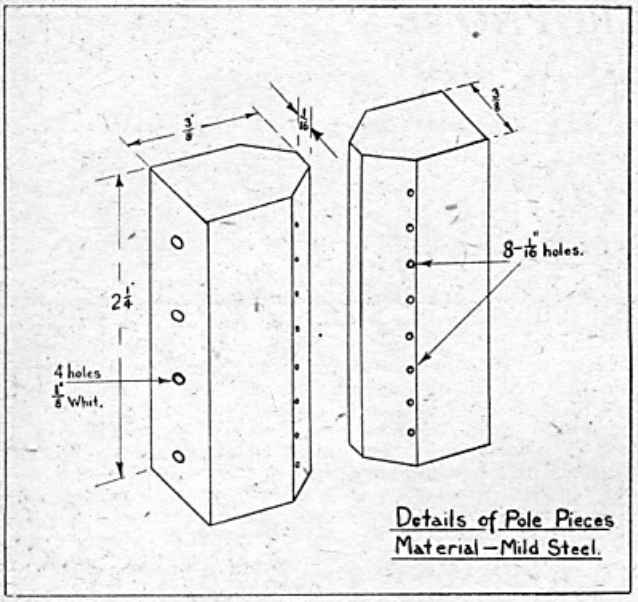


Fig. 1.

are not drilled right through, about 3/16 of an inch should be sufficient.

The front face of the pole pieces, that is, the face opposite the one in which the ⅛ inch tapped holes are, is ground so that only a narrow surface is presented to the edge of the ribbon. (See fig 1). This face should be between ⅛ inch to 1/16 inch along the whole length of the ribbon.

THE BRIDGES.

The bridges, as the name indicates, are the strips to which the ribbon is clamped at each end of the microphone. They are composed of ¼ inch bakelite cut in the shape of a semi-circle and are fitted in the bend of the magnet and on top of the pole pieces.

On each piece of bakelite three holes are necessary. One at top centre, which takes the machine screw holding the bracket by which the bridge is mounted. Two other holes are needed towards the wide section. These holes were tapped to take a ⅛ inch bolt, and are for the brass strip by which means the end of the ribbon is clamped.

Undoubtedly other methods of mounting the bridges could be devised. However, in this case the method used appeared to be the easiest. Not only did it appear the easiest, but it provided a very simple method of adjusting the ribbon for centre of the pole pieces. It was only necessary to bend the bracket in the desired direction.

THE RIBBON.

The article in QST mentioned earlier, used for a ribbon good quality tinfoil and may be identified by the tinkling noise when a strip is waved in the hand. Quoting QST "The noise is distinctly metallic and usually a foil giving this noise will have good tensile strength. A lead foil will not have the proper springiness, but may stretch if put under slight strain. A good foil, if slightly wrinkled, can be stretched in the same manner as a coil spring, provided the stretching is not too violent."

The writer in pre-war days having visions of constructing such a microphone had stored up such a piece of tinfoil. In the good old days, chocolate came wrapped in good foil, and this is where the foil used camed from. This foil was half of one thousandths of an inch thick and proved ideal for the purpose.

Firstly the sheet of foil was cleaned to remove any trace of grease that may have remained on the surface—bright, clean surfaces are necessary for good contact to the clamping strips. A strip ¼ inch wide was cut from the piece of foil. This may be done by laying the sheet on a piece of cardboard and carefully drawing a razor blade along the edge of a rule. The strip of foil was then laid on a pad of felt and a small gear wheel run along it to form the 'crinkles."

If care has been used in doing this the ribbon should be quite straight along the edges. Holding both ends of it the ribbon may be gently stretched, and when one end is let go it should spring back.

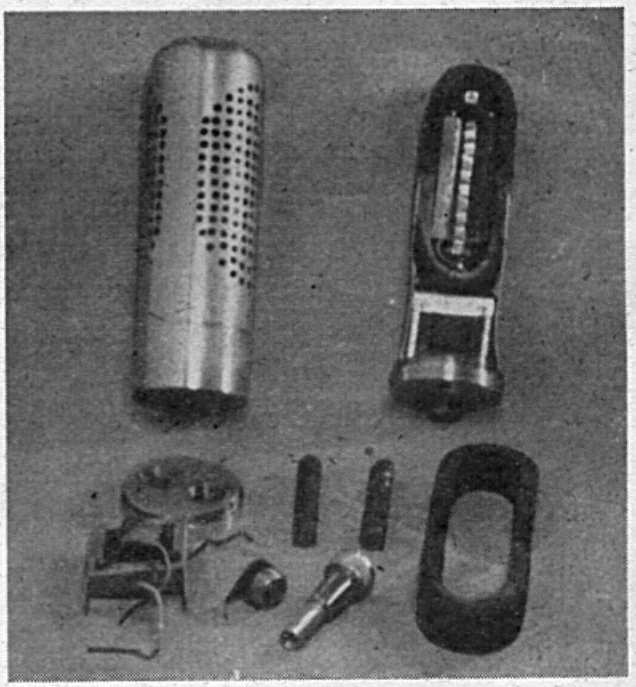
THE CASE.

Individual constructors will have their own ideas of the type of case which would suit their construction methods best.

In this instance there was on hand some 2 inch diameter Dural tubing. This fact was taken into account before the magnets were constructed, so that the magnets were made so that they would fit inside the tubing. This Dural tubing when properly buffed up results in a very high polish, and looks a really professional job.

The front and back of this tubing was drilled out with ⅛ inch holes to form a pattern. This can be seen in the photographs. The work of drilling all these holes, one will realise is no small task, but the result is well worth while.

The cap on the top consists of portion of an old aluminium piston, one from a Baby Austin is almost the right fit, and also polishes up beautifully. The top was turned up in a lathe to form a dome, after which the piece of tube was heated up and the top cap forced in. This, of course, makes it a very tight fit. The other end of the tube was screw cut on the inside. This was to allow the base plate to be screwed in.



The pieces used in construction.

This base plate or plug was turned up from a piece of ½ inch thick aluminium, and on this plug the entire microphone is mounted. This can also be seen in the photographs. In this plug two ⅛ inch holes were drilled to allow machine screws by which the "works" are bolted down.

To allow mounting on a stand, a ⅝ inch tapped 27 threads per inch (standard microphone thread) was drilled. Opposite this hole a ⅛ inch hole was drilled. This was to take an "Amphenol" PC1M chassis mounting type microphone connector. The other connector, MC1F, of course, fits onto the end of the microphone cable.

(Continued on page 15)

NEW TUBES

6N4; 2C40; GL3C22; 6AJ5; 0A2; 4-250-A; 822S

Developments by Vacuum-Tube laboratories these days appear to be concentrated in the U.H.F. and V.H.F. fields. In view of the likelihood of increased Amateur activity in these regions, the following new releases should be of interest to Hams.

Raytheon 6N4.

The 6N4 is typical of the type of tube with which the Ham will be working in the near future. It is a triode capable of working as an oscillator, amplifier, or a doubler up to frequencies as high as 500 megacycles. By reducing inter-electrode capacitances, shortening lead lengths, and producing high transconductance in this tube, efficient operation at these frequencies is made possible. It looks as though this tube will be widely used in M.O.P.A. rigs, walkie-talkies, and portable-mobile units.

Characteristics—6N4.

Heater voltage	6.3 volts
Heater current	0.2 amperes
Plate voltage	180 volts
Plate current 12 milliamperes (Class A amplifier)	
Grid voltage	3.5 volts
Amplification factor	32
Transconductance	6000 ohms

General Electric 2C40

Designed for Amateur use in the proposed V.H.F. bands up to and including 2500-2700 megacycles, is this G.E. triode "lighthouse" type tube, the 2C4O. As a local oscillator it is capable of giving a power output on 3370 megacycles of 750 milliwatts with a plate voltage of only 250 volts. As a class A-R.F. amplifier in receivers it is good up to 1200 megacycles. It has a six pin octal base and may be mounted in any position.

Electrical Characteristics—2C4O.

Heater voltage	6.3 volts
Heater current	0.75 amperes

Direct Interelectrode Capacitances.

Grid Plate	1.3 uufd
Grid-Cathode	2.0 uufd
Plate-Cathode	0.05 uufd
Cathode R.F. connection-cathode	4.5 uufd

Average Characteristics.

Grid voltage	1.7 volts
Amplification factor	36
Grid transconductance, Ib equals 17 milliamperes	4850 umhos
Frequencies for max. ratings	3370 megacycles

TYPICAL OPERATING CONDITIOSS—2C4O.
Grid separation circuit.

Class A R.F. Amplifier	Typical Operation	Maximum Rating
D.C. Plate voltage	250	500 volts
D.C. Grid voltage	—3	25 volts
D.C. Plate current	15	25 milliamps
Plate input	3.75	watts
Plate dissipation		6.5 watts
Noise figure (small signals)	8.5	decibles
Power gain (small signals)	15	decibles
Frequency	700	1200 megacycles
C.W. Oscillator. Intended primarily as a local oscillator in the frequency range 100-3370 m/cycles.		
Frequency	3370	3370 megacycles
D.C. Plate voltage	250	500 volts
D.C. Grid voltage (Rg—10,000 ohms)	—5	volts
D.C. Plate current	25	25 milliamps
Plate input	5	watts
Plate dissipation		6.5 watts
D.C. current (approx.)	0.3	milliamps
Plate power output	0.075	watts

G.L. 3C22.

Another tube likely to be of interest to the Ham will be the G.L. 3C22. If you want to push out 50 watts at 600 megaclcles, this is your tube; it will do that with 1000 volts on the piate. However, forced air cooling at the rate of 30 cubic feet per minute is required for cooling. Above 750 megacycles the heater voltage should be reduced 0.5 volt below normal.

A stack of external circular fins is an integral part of the plate connection to this tube which permits the maximum plate dissipation to be so high. It has a six pin octal base and may be mounted in any position.

Electrical Characteristics—G.L.3C22.

Heater voltage	6.3 volts
Heater current	2.0 amperes
Heating time	1.5 minutes

Direct Interelectrode Capacitances.

Grid-Plate, shield on radiator	2.4 uufd
Grid-Cathode	4.9 uufd
Plate-Cathode, shield on grid and radiator	0.05 uufd

Average Characteristics.

Amplification factor	40
Grid-plate transconductance, 1b equals 50 mA	5000 micromhos
Frequency for maximum ratings	1000 megacycles

Maximum Ratings.

Class C R.F. power amplifier and oscillator. Key down conditions per tube	
D.C. Plate voltage	1000 volts
Peak plate voltage (under modulation conditions)	2100 volts
D.C. Grid voltage	2000 volts
D.C. Plate current	150 milliamperes
D.C. Grid current	70 milliamperes
Plate input	150 watts
Plate dissipation	125 watts

6AJ5

Tung-Sol has added to the list of V.H.F. and U.H.F. miniature glass-button based tubes the 6AJ5, a pentode intended for operation at plate voltages in the order of 28 volts in low power applications at these frequencies. In most applications where higher voltages are available, the 6AK5 should be used.

In the case of a push-pull Class AB1 amplifier, however, 6AJ5s are the tubes to use. They will deliver an output of one watt with 180 volts on the plates, 75 volts on the screen, and —7.5 volts grid bias. Under these conditions the plate to plate impedance is 28,000 ohms, second harmonic distortioc is two per cent., and third harmonic distortion is five per cent.

Electrical Characteristics—6AJ5.

Heater voltage	6.3 volts
Heater current	0.175 amperes

Interelectrode Capacitances.

Plate to control grid (with shield)	0.01 uufd
Input	4.1 uufd
Output	2.0 uufd

Mavimum Ratings.

Plate voltage	180 volts
Screen voltage	140 volts
Plate dissipation	1.4 watts
Screen dissipation	0.5 watts
Cathode current	18 milliamperes

Typical Operating Conditions.

Plate voltage	28 volts
Screen voltage	28 volts
Cathode bias resistor	200 ohms
Plate current	3 milliamperes
Screen current	1.2 milliamperes
Amplification factor	250
Plate resistance	90,000 ohms
Transconductance	2,750 micromhos

R.C.A. OA2.

This tube is a miniature type of cold cathode, glow discharge regulator type designed for regulation of "B" and "C" voltages in compact equipment where space precludes the use of the larger standard regulator tubes. The D.C. operating current range for this tube is 5 to 30 milliamperes and its output voltage 150. Its characteristics are substantially the same as the OD3/VR150.

Eimac 4-250A.

The big brother to Eimac 4-125A is the 4-250A, a kilowatt tetrode capable of giving 75 per cent efficiency at 100 megacycles. The filament takes 5 volts at 10.5 amperes. Maximum ratings are as follows:—

D.C. voltage	4000 volts
D.C. Plate current	350 milliamperes
D.C. Screen voltage	600 volts
Plate dissipation	250 watts

Taylor 822-S.

The Taylor 822-S is an all-round general-purpose high-power triode limited in R.F. applications to the vicinity of 30 megacycles. It's appearance is very similar to the 810 with the plate cap on top and the grid cap on the side. It's carbon plate has a dissipation rating of 200 watts. A pair of 822-S in a Class B modulator will give a kilowatt of audio with 3000 volts on the plates (500 mA. max. average plate current). At 1500 volts and 390 mA. the output is reduced to 400 watts. In Class C Telegraphy service a single tube is capable of 600 watts output at 2500 volts and 300 mA. plate current. Required driving power for this type of service is 17 watts. In plate modulated Class C amplifiers maximum plate voltage is 2500 and plate current is 250 mA. Driving power required is 13.7 watts.

Electrical Characteristics.

Filament voltage	10 volts
Filament current	4 amperes

Interelectrode Capacitances.

Grid to Plate	13.5 uufd
Input	8.5 uufd
Output	2.1 uufd

Typical Operating Conditions.

Plate voltage	2000	2500 volts
Plate current	300	300 mA.
D.C. Grid current	51	51 mA.
D.C. Grid voltage	—130	—190 volts
Plate dissipation	140	150 watts
Power output	460	600 watts

It is with regret that we learn of the death from illness of Flying Officer Gordon Lander Templeton, VK3OW. Gordon obtained his ticket in 1930 and was a member of the R.A.A.F. Wireless Reserve before the war. As such he was called up for service immediately war was declared and was still in the Service at the time of his death on October 8, 1945. To his widow and two small children we extend our deepest sympathy.

IN REVIEW

TECHNICAL BOOKS —— RECORDINGS —— PRODUCTS

RECORDINGS.

ORCHESTRAL.

Spitfire and Prelude, EB242, played by Halle Orchestra conducted by William Walton.

Written specially for the film "First of the Few," the contemporary English composer, William Walton, in conducting this incidental music gives us a thrilling authentic version and a brilliant performance.

Adagio Strings, ED230, played by N.B.C. Symphony Orchestra, conducted by Toscanini.

A particularly fine recording of the work of the contemporary American composer, Samuel Barber. This work has acheived great popularity in concert performances. The playing is superb and the recording fine.

VOCAL.

Lily Pons sings with the Metropolitan Opera Orchestra two excerpts, "He Must Depart," and "Every One Knows" from Donezzetti's "The Daughter of the Regiment." LOX 574.

This coloratura soprano made her debut with the Met. Opera Co. in 1931 with sensational success and immediately became leading member of that company. She has sung in opera and concert in Paris, Rome, and London, and also has a wide following in Radio programmes and films. She gives a very fine performance of these two arias.

Webster Booth with Halle Orchestra. Take a Pair of Sparkling Eyes and A Wandering Minstrel. EB243.

Both these excerpts from the Gondoliers and the Mikado respectively are well known to lovers of Gilbert and Sullivan. The popular English tenor, Webster Booth joined the D'Oyley Carte Opera Co. in 1923. This disc is one of the most amazing vocal recordings ever issued. The reproduction gives one the impression of it having been recorded in a cathedral.

POPULAR VOCAL.

"Don't fence me in," and "The Three Caballeros." Y5909.

Bing Crosby enlists the aid of the Andrew Sisters for his version of these two numbers and he and the girls reach a very high standard in both. Recomended as being the best record from this team.

"Riding Down the Canyon" and "You're the Moment in a Lifetime." Y5911.

Bing Crosby turns cowboy to sing the "Canyon side." His famous whistle is absent and somehow one expects to hear it in this sort of song, nevertheless the disc and recording are excellent. The reverse is a Spanish song in which we hear Bing sing in Spanish and English.

DANCE.

Victor Silvester and His Ballroom Orchestra. "My Heart and I" (foxtrot) and "There are Angels Outside Heaven." (waltz). DO 2737.

Two perfect examples of Vic Silvester's strict dance tempo.

"Dance and be happy," says Vic Silvester. "Dancing is enjoyed by every nation in the world and ballroom dancing is one of the greatest social amenities of life."

Joe Loss and His Orchestra. "Come with me my honey" and "Rosanna." EA3263 "My Beautiful Sarie Maria," and "Together." EA3258.

No small part of Joe Loss's success comes from his irresistible tempos in dance music. His arrangements are excellent—his musicians first class and his own early studies in both serious and gay music have given all his numbers that polish and musicianship that can only come from a dance orchestra of the higest quality. His new titles are a good illustration of this.

JAZZ.

Duke Ellington and His Orchestra. "All Too Soon," H.M.V. EA 3254 "I never felt that way before."

In these days of commercial swing this Ellington double is a perfect example of real jazz. Performance and recording of this disc is excellent.

BOOKS

INTRODUCTION TO MICROWAVES

By Simon Ramo, Ph.D.

This little book is unique in that it is written for the benefit of engineers who are familiar with alternating current phenomena at very low frequencies, that is to say at frequencies in the power supply range, not at the very most the lower radio frequencies. Thus an attempt is made to introduce the reader to the elementary concepts or circuit behaviour at ultra-high frequencies without first covering the ground of "Concentional", or medium and high frequency circuits.

This may seem rather ambitious until one realises that the behaviour of familiar circuit elements at ultra-high frequencies is as unlike their behaviour at high frequencies as the latter is to that at power frequencies. Thus to give the semi-technical reader a basic understanding of the ultra-high frequency phenomena it is not necessary, and indeed not even desirable, to first teach him something about the radio frequencies which lie between the two extremes.

Commencing by setting out the ways in which electricity is common over the entire frequency range, Dr. Ramo then proceeds in the second chapter to show in what way Microwaves differ from low frequency electricity. Having thus laid the foundation he discusses in more detail the points of difference—how Microwave currents travel not in conductors but at the boundaries of their surface with surrounding media; how electrons travel with a finite velocity, enormous in relation to low frequency effects, no so great when we view it in relation to Microwaves. Thus is introduced the familiar concept of transit time, which we have found to be important even at frequencies lower than the ultra-highs.

In the next chapter we are told (or reminded, as the case may be) how a flow of electrons through space can induce a current in a circuit system, an effect common to all frequencies. Following on from this the author tells us about retardation, the electromagnetic equivalent of transit time; the effects of retardation and radiation on circuits; displacement current; resonant cavities; guiding Microwaves; transmission line concepts; hollow pipe wave guides; Microwave phenomena as a series of waves; voltage current and impedance concepts; and finally how a Microwave antenna combines concepts all the way from DC to light-wave frequencies.

The book serves its purpose excellently, it gives in clear and simple terms, without any mathematics whatever, the basic ideas upon which Microwave theory is built. The Appendix includes the titles of eleven books dealing in greater detail with electrical theory from DC to ultra-high frequencies.

(Introduction to Microwaves. Simon Ramo, Ph.D. (McGraw-Hill, New York, 1945-. 133 pages, 5" x 8", plus Appendix and Index, 120 diagrams, cloth bound, 12/3. Copy by courtesy Technical Book Shop.

THE ELECTROLYTIC CAPACITOR

Alexander M. Georgiev, M.Am.I.E.E.

The object of this book it is pointed out by the author, is to describe the construction, manufacture, function and testing of dry and wet electrolytic condensers. to ex-

plain the operating characteristics of the various types and to indicate both their useful application and their limitations.

The book should be primarily of value to people concerned mainly with the design and manufacture of electrolytic capacitors, and also to those concerned with design, production and maintenance of equipment in which electrolytic capacitors are used—radio receivers and transmitters, sound systems, electronic devices generally, telephone circuits, electric welding equipment, and single phase induction motors of the "capacitor" variety, such as are finding constantly increasing application to refrigerators, washing machines, oil burners and the like.

The subject matter covers comparisons between electrolytic and other capacitors, between wet and dry electrolytics, the electrodes, theoretical and practical considerations of the dielectric film and methods of producing it, etching of aluminium electrodes, spacers, electrolytes, cans, winding of capacitor sections, impregnation of dry types, measurements and tests, faults and emergency repairs, general design, trends in development, and applications of electrolytic capacitors.

Appended to the text are a glossary of terms, a bibliography and a comprehensive list of U.S. and other patents directly or indirectly related to electrolytic capacitors.

The book is profusely illustrated with line diagrams and exceptionally clear photographs.

THE ELECTROLYTIC CAPACITOR—Alexander M. Georgiev, M.Am.I.E.7.—(Murray Hill, New York, 1945-, 159 pages, 6" x 9" ,plus appendix and index(86 diagrams and illustrations, cloth bound, 24/-. Copy courtesy Technical Book Shop.

—ELECTRONIC EQUIPMENT AND ACCESSORIES.—R. C. Walker, B.Sc., A.M.I.E.E., A.M.I,Mech,E,

During recent years a new branch of electrical engineering has appeared, or to be more correct, has been given a name "ELECTRONICS." Like all things new it is just being publicised to the limit; many things are claimed for it, which are economically unsound, being accomplished with equal efficiency and at less cost by simple mechanical means, other assorted wonders and marvels are being loudly acclaimed which have been in actual fact common knowledge for years.

Mr. Walker sounds a note of caution against overenthusiasm for electronic devices when he says "While it is true that the simple electronic devices have found their way into all industries, economic considerations invariably decide whether their use is justified. When a simple mechanical device will meet the requirements, the novelty of an electronic device will be no recommendation for its adoption." In other words it is of little use to contrive a Health-Robinsonian conglomeration of power supplies, vacuum tubes, gas tubes and relays to ring a bell, or to put the cat out, when a mechanical arrangement in the case of the gong, or a simple manual for pedal action in the case of the feline will achieve the same object with equal, or perhaps greater efficiency.

In the early chapters, the fundamental characteristics of the electron tube are dealt with, also its various applications. Separate chapters are devoted to gas-filled tubes, light sensitive devices, and the applications of light cells, while the principles of the Cathode Ray Tube and the methods of using it are described.

The "Accessories" mentioned in the title include miscellaneous electronic devices such as neon tubes, magic eye indicators, etc., small switch gear, time delay devices, recorders and counters, and miscellaneous circuit accessories (small motors, metal rectifiers, selsyns, remote indicators). These are all fully described, together with their applications in relation to electronic devices.

ELECTRONIC EQUIPMENT AND ACCESSORIES

C. Walker, B.Sc., A.M.I.E.E., A.M.I.Mech.E,—(Newnes, London, 1945)—369 pages, 6" x 9" plus appendix and index, 343 illustrations, cloth bound, 40/-. Copy by courtesy Technical Book Shop.

OUR FRONT COVER

V.H.F. TRANSMITTER-RECEIVER COMBINATION

The amateur with a leaning toward V-H-F QSO's will have more than a passing interest in equipment of the type pictured here, for the reason that it is a commercial product embodying principles well familiar to earlier day "five metre" men.

It is the Philips DR106, made in quantity during the war for the Allied Services, and used particularly for short-range inter-vessel Naval R/T Communication.

As with most types of radio equipment for the fighting services, the design is one of special robustness. whereas the Ham would achieve the same effectiveness of QSO with a much lighter affair, probably of "breadboard" construction, service demands are that gear must withstand possible rough usage. Those in the factories know that one military specification requirement is the drop test, where gear is dropped about 50 times from a height of 2 feet or 80 feet in to solid concrete. Solidity with unbreakability are the yirtues required—**and** attained by our wartime radio manufacturers.

DR106 is built complete into a steel case with watertight lid, and comprises a MOPA TX using 6V6G, M.O., with P-P 807's as P.A., modulated by P-P 5V6G's and 6V6G phase-splitting sub-modulator. Frequency range is from 60-80 Mc/s. The receiver is a super-regenerative type with tuned R.F. stage, essential for "anti-squeal" and uses 954 R.F., 955 self-quenching detector, 6J7G first audio, with 6V6G output to the panel speaker or headphones.

Power ratings for the transmitter are: R.F. output of 13 watts at 60 Mc/s, and 8 watts at 80 Mc/s. Versatility must be the keynote of service power requirements, so provision is made for power supply alternatively from 115 volts A.C., 12 volts and 24 volts D.C.

Power consumption under these conditions varies from 230 to 185 watts.

The equipment is designed for use with either a vertical end—fed antenna or the usual centre—fed dipole with coaxial line.

Finished in grey matt lacquer with white outlined engraving of indicated controls this DR106 by Philips is an attractive proposition for many post-war commercial utility applications.

CORRESPONDENCE

Editor "A.R.,"

During the month we received at Federal Headquarters a circular from an Amateur Radio Society in West Australia under the name of "Transix." No doubt many have received a copy.

It seems that these people have an axe to grind, but they do not make it clear what their grievance is. However, their circular, vague though it is, merits a reply, and we give it herewith, addressed as is customary, to their Secretary.

Dear Mr. X,

Your circular was unsigned, so we have to call you Mr. X or Mr. Smith or something like that. There are a lot of Mr. Smiths who read "A.R." and we wouldn't like to offend them, so Mr. X it must be. You won't mind, will you?

There are two reasons why a circular is sometimes unsigned, one being that it costs less to post, unless you sign with a rubber stamp and rubber stamps are hard to come by these days— or are they? The other reason we can neglect—no responsible Ham would make use of it.

You mention that Hams will be thinking about the speedy return of gear to "rightful ownership." Since each Ham's gear, although temporarily removed from his possession, has never changed owners, it almost looks as though you mean it should be returned to someone else, that it really doesn't belong to the chap who passed it in, but to somebody else.

You talk, dear Mr. X, of new regulations, too. Of course by the time you read this, if you ever read it, (it's obvious you don't usually bother to read "Amateur Radio"), the gear will have been returned, and the new regulations probably will have been gazetted. Isn't it amazing what your organisation can do—with a little incidental help from the W.I.A.

You say that you don't want to see amateur radio cramped within those "experimental" limits of pre-war days, the cause, you assert, of the "mass of meaningless jargon" on the bands heretofore. Really! dear Mr. X, what an astounding piece of self-contradiction. Sometimes, you know, you must even amaze yourself!

Don't you realise that the "meaningless jargon" was so prevalent simply because a lot of Hams in pre-war days were not sufficiently experiment conscious?

Don't you know that some of the greatest ideas in the science of radio communication came about because of the Ham urge to experiment. Yours is indeed a strange attitude for "An Organisation of Licenced Radio Experimenters."

So there is no co-operative effort among Hams in some States. If this is so, and if you mean VK6 in particular, THEN THE FAULT IS YOUR OWN!

Why talk of a "new National Amateur Organisation" when such a thing is already in existence? You say, dear Mr. X, that you want an organisation with a democratic vote—if you will take the trouble to find out something about the W.I.A. you will see that the whole show is truly democratic through and through. You believe that an organisation along the lines of the A.R.R.L. with a democratic vote, could function successfully in Australia. **IT HAS DONE SO FOR SOME 33 YEARS.** As a matter of fact is is older than the A.R.R.L.

And you wanted a printed "National Amateur Magazine," Mr. X, you have that, too!

Apparently you think the W.I.A. is not all it should be. Very well then, it is in your power to improve it.

WHY DON'T YOU GET INTO THE W.I.A., MAKE YOUR PRESENCE FELT AND TAKE STEPS TO CHANGE WHAT YOU DON'T LIKE?

Remember this, the man who offers good, sound constructive criticism engenders respect, but the chap who, because he can't always get his own way with his fellows, sets up on a soap box all his very own causes nothing but mild amusement. The choice is yours.

ALEC H. CLYNE, VK3VX,
Federal Secretary, W.I.A.
24 Charles Street, Adeliade.

Editor "A.R."

Hearty congratulations on the October Number of "A.R.", which has just come to hand. If you can maintain and advance from this standard you will be doing a great service to the W.I.A. and Ham Radio generally.

The general set up appeals to me strongly, making the reading and location of the features quite easy. The way you have balanced the subject matter is also considered excellent. Please let us know what you want in the way of co-operation from us over here and we shall be pleased to comply. Again, congratulations on this effort, and best wishes for a bigger and better "Amateur Radio."

IVOR THOMAS, VK5IT
President, S.A. Division.

Editor "A.R."

I would like to convey my appreciation to the Magazine committee for the FB effort with this month's "A.R."

It is well arranged and nicely produced and I think the cover alone should increase greatly the sales.

I have always admired each month, the work that it takes to produce "A.R." in the duplicated form. I was similarly conected with the production of a magazine for the Zero Beat Radio Club about 1936, and I know how much time must be spent when there are stencils to be cut and duplicated.

Well, boys, my thanks for your fine effort to amateur radio in general to keep the Magazine on the go during the past years, and I sincerely trust it will be possible to obtain sufficient advertising to maintain the paper in its new form.

ROGER TORRINGTON, ex-VK2TJ

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TUBES WHILE YOU WAIT.

During the push across Europe which preceded the German collapse in May. the United States Forces came across a telephone system from which the retreating enemy had removed the tubes and left the rest of the equipment intact. Being of German design, no substitute tubes were available, so a sample was rushed by air to the Bell Telephone Laboratories with instructions to duplicate the tube and to deliver 1000 immediately. Within three days experimental models were on the plane to Europe, and within three weeks the 1000 tubes had been delivered and the telephone system was back into operation.

The Late Sir Ambrose Fleming

It is with regret that we hear of the death of Sir Ambrose Fleming, D.Sc., F.R.S., in his 96th year, on April 18, 1945.

John Ambrose Fleming was educated at University College, Gower Street, and at the Royal College of Chemistry. He graduated B.Sc., and worked at South Kensington under Professor F. Guthrie and presented his first scientific paper on "The Theory of the Galvanic Cell" at the inaugural meeting of the Physical Society in 1874.

He relinquished in 1877 a teaching post at Cheltenham College, to go to Cambridge chiefly with the object of working under Clerk Maxwell in the then recently erected Cavendish Laboratory. There for two years, he says, "I enjoyed Maxwells' stimulating teaching and intercourse." In the year that Maxwell died, 1879, Fleming was appointed scientific adviser to the Edison Telephone Company, and three years later to a similar position with the Edison Electric Light Company, formed to introduce incandescent electric lighting into England.

In 1885, he was appointed Professor of Electrical Engineering at London University; a post he held until 1926.

It was in October, 1904, that Fleming, then scientific adviser to the Marconi Company, whilst studying phenomena in incandescent lamps, which had already been observed by Edison, discovered that a perfect device for rectifying the current induced in a receiving aerial existed in a high-vacuum tube containing two electrodes.

In the following month, Fleming took out the fundamental patent No. 24850, covering the thermionic valve. The title of the patent was "Improvements in Instruments for Detecting and Measuring Alternating Electric Currents." This valve, which was soon used in practical wireless reception by the Marconi Company, was the first technical application of the emission of electrons from an incandescent conductor in vacuo.

The early Fleming valves had carbon filaments surrounded by a metal cylinder, but in 1908, Fleming found that tungsten wire possessed advantages in that it could be heated to a higher temperature.

Writing in Wireless World, in 1925, Fleming states: "I was was well aware that the anode current could be reduced by holding near the valve a permanent magnet, but unfortunately it did not occur to me in sufficient time that this could be controlled by inserting a spiral wire or metal mesh cylinder between the filament and the anode, and giving to this grid small positive or negative potentials."

Fleming was the author of many scientific papers and standard text books, amongst them "Fifty Years of Electricity" (1921), and "The Thermionic Valve" (1919), published from the offices of Wireless World.

Sir Ambrose received many awards and honours for his work in electrical physics. In 1892 he was elected a Fellow of the Royal Society, and in 1910, he received the Societies' Hughes medal. In 1921 he received the Albert medal (R.S.A.), in 1928 the Faraday Medal (I.E.E.), in 1931 the Dudell Medal (Physical Society), and in 1935 the Kelvin and Franklin Medals. He was knighted in 1929.

HAMS ON SERVICE

If anybody reads this this month it will be on account of the forbearance of "ye Hon. Editor." What with Blackouts and shut warehouses life has been a trifle mixed at your correspondent's QRA and, alas, following the bad example set by all you chaps who forgot to send in any notes, I also forgot, till a "gently worded," but nevertheless blunt telegram arrived, signed "Hogan" . . . so as I said at the start you may never read this collection at all. So I am as popular with the Hon. Editor as most of my usual correspondents are with me. Hi!

Since I last wrote I had the pleasure of meeting Bill Moore on his arrival in Sydney after a quick trip from Batavia. Apart from being about two stone underweight, he was the same old Bill Moore. As is the case usually it was impossible to get anything from him, except that he had constructed the Camp's Radio, which comprised various tubes, and those included Acorns, and that it ranged from battery plate supplies through vibrator units up to using the camps AC supply, which was OK till the Japs instituted a blackout. Hi! Bill brought home the single headphone he used for listening . . . reckons he has over 8000 hours to his credit—ABC and BBC.

Bill Lewis, 6YB/2YB, gave me the first news of Bill in a short note to say that "2HZ had apparently got hold of some xmitting gear as he had contacted one of our aircraft flying in the vicinity and subsequently, after a message had been dropped to him, contacted our local "Airadio." A few days later I received another note to say that Bill had arrived unexpectedly at 6YBs QRA and they had spent the whole afternoon discussing Ham radio with the help of the latest ARRL Handbook—and two copies of "A.R." Fl/Sgt. Doug. Watson, 7DW, added another VK State to the occasion. So it didn't take 2HZ long to get back to ham radio, and from then on, he was greeted by Hams at every stop, even having the company of two of them on the trip over from Melbourne to Sydney. Bill Moore, 2HZ, has always been a keen Ham and not even three years of the Nips made any difference.

On his own account, Fl/Lt. Bill Lewis hasn't much to say. Now that everything is over life is very pleasant as they are camped just at the beach and Sports Meetings and Troop Welfare has taken priority over the Nips.

It appears that I took Cec. Light out of the R.A.A.F. a bit in advance—so he informed me while adjusting the fifty foot stick at Wal Ryan's, 2TI, over at Kingsford. Cec. says he is still in it and looks as though it suits him. He didn't seem too safe to Wally and I perched up on top of the stick, but he assured us it wasn't near as bad as one night he took a Lancaster up, forgot to fasten his safety belt and then started to take evasive tactics to avoid a nightfighter. Hi!

S/Sgt. Alan Jocelyne, 2AJO, writes from Digger's Rest —and one conjures up pictures of Alan at the Veteran's Home, but, its all false as he informs that the name comes from the gold diggings, and has nothing whatever to do with tired troops such as himself. His Mess has six in it and five are Hams—George Downing, 3GD, "Mac" Macgregor, 3XZ, Bert Cusick, 3MQ, Bill Shakespeare, a VK2 without a call, and 2AJO. Alan says we can imagine what the conversation is about every meal, but what I would like to know is what the sixth chap talks about. Hi!

Sgt. Jim Stevens, 3ZK, duly rang up MU 1092, and has now been rewarded with his packet. I hope you DID get it Jim, om. Reckons he wants more respect from VK2 chemists—but I couldn't see any reason for it!!!

Had a note from Jack Mackel, 2HG, since our last issue —he just happened to find a copy of August "Amateur Radio," and thought he had better report himself. How August "A.R." got to Jacquinot Bay he did not say, but, as I've told you before OUR MAG. just does get around, and each copy does "umpteen" Hams. For over two years he has been with 1st Aust. Inf. Troops W/shops, Wireless Section, and knows far more about servicing receivers than he used to. He sends 73 to all the gang and wants to know "what bands we will get back on?"—and THAT is what everybody wants to know, Jack, om.

Jack Coulter, 3MV, complains that he always gets "Amateur Radio" just after the ship has left a port wherein were several Hams that he reads about too late —He wants more co-operation between the Hon. Ed. and the Navy. Hi! OK, Jack, I'll get Tommy to see "'em" for you. 2YC. He sends a cheerio to Clarry Castles, 5KL, and hopes to QSO him again soon, reckons it all of ten years since their last QSO. Hi!

That Red Headed Sailor, Syd Clark, has arrived safely in Nippon land — or is it their land, anymore? — and doesn't seem to like it as good as VK2. Syd missed all the VJ Day celebrations—nearest was when he arrived at Townsville a day after the celebrations ended, and as Syd says "things were really quiet." He reports good gear being scrapped by the U.S. and regrets he was going the "wrong way." — 832's, lighthouse tubes, sockets, modulating equipment — as Syd says, what a pity he didn't have a spare ship. Hi!

On the trip up Madang, Hollandia, Biak, Morotai, Subic Bay, Hong Kong and thence to Japan, he was unlucky to miss several Hams although he says all Radio Service men reckon they will be Hams as soon as tickets are issued again. At Manilla he met S/Sgt. Dan Scott, W6CBZ, who worked many VKs, being on for ten years before the war. At Morotai he just missed Fl/Lt. Radclyffe, a friend of Perc Dicksons, but he did strike Jim Dickie, a VK2, whose call Syd couldn't remember, but that was all the Ham Radio he struck between here and Japan. Hi!

To revert back to Jim Stevens, VK3ZK, who while on a visit to Melbourne recently (some people are wondering just why Jim is so eager to get to VIM these days), tells a story about an electrolytic condenser. Readers may remember that some time ago we published several ideas of rejuvinating defunct electrolytic condensers. Well on one of the R.A.A.F. stations some of the boys decided that they would try out the cure. As a result, this gang had visions of getting a fortune from the patent they intended to take out. After carrying out the directions, they discovered that the re-juvinated electrolytic condenser was giving a voltage?

From Bill Williams, VK3WE, we learn that his eldest son has arrived back after being a POW since the fall of Java. Bill writes, "He finally turned up working in a Jap coal mine in Japan, and after the surrender was promptly brought out by the Yanks, flown to Manila and then to Morotai, Darwin, and Melbourne. He was only a little over 6 stone and just about 'out' when they got him, but he has put on weight rapidly in the last six weeks, and although very nervy and old about the eyes, he is picking up rapidly."

Corporal Bob Stevens, VK3OJ, at Wewak reports having to service a set used by ANGAU recently, and sends the following particulars. Made by AWA the 3BZ is also known as a Teleradio and comprises three units of similar size—receiver, transmitter and speaker with a compartment for spare tubes. It is battery operated. Line up of transmitter is CO or MO 6V6 and 807 final either CW or fone, plate modulated by parallel 6V6's driven by a 6V6 mike amplifier. The carbon mike is excited by voltage developed across a resistor in the cathode of the 807PA and is resistance coupled to its amplifier. Plate supply is derived from a 12 volt battery by means of a vibrator, and the power output is rated at 15 watts. The receiver, superhet, has a RF stage and is operated from a 6 volt tapping on the battery with its own vibrator for plate supply. A five band wave change switch enables coverage of the broadcast band and the high frequency spectrum up to 20 metres. Bob says he located the trouble in this set, in the plate load resistor of the 6V6 mike amplifier, and the set goes, he says, "like a house on fire" and that the receiver "performs very nicely."

From Townsville comes a note from F/Lt. Len Burston VK3BV, who says the Yanks are going to town on the 20 metre band. He has heard quite a number coming through—some using X4 and J calls.

Well, this again seems to be the issue for this month. It seems as though the more time you boys have to spare the less you feel inclined to send me some notes. You should have some very good stories to tell, so why not drop me a line—J. B. Corbin, VK2YC, 78 Maloney St., Eastlakes.—MU 1092.

A RIBBON MICROPHONE.

(Continued from page 6)

THE TRANSFORMER.

This is one item which caused some concern, as it was desired that it be of such a size that it would fit inside 2 inch diameter tubing.

At the time of construction transformers for particular applications were very hard, if not impossible, to come by. It was, of course, necessary to feed the microphone into a low impedence line.

The original intention was to employ the good old Ham method and use a speaker input transformer—one of the small 5 inch type. A rough calculation of impedence ratio showed that, assuming the impedence of the ribbon to be ½ an ohm—a value which was probably high—the reflected impedence on the secondary of the lowest standard winding available, which was 2500 ohms, would be far too high for a 200 ohm line. 200 ohms for the line was chosen for the reason that 200 ohm to grid transformers were already available. The choice of line impedence is of course entirely a matter for the individual constructor.

The only alternative to the problem was to get to work and wind a suitable transformer.

Some readers will, no doubt, recall HX's exhaustive inquiries on the subject of transformer design—in fact, he still has vivid recollections of delving into design in various handbooks.

The Radiotron Set Designers' Handbook, and the RSGB Handbook proved to be most helpful, and in the RSGB Handbook a formula is given for certain types of lamination steel and their shape, as well as the type of winding. E type of laminations being the easiest type to manufacture these were used.

The writer, believing in short cuts, decided that he might well use this formula—the only drawback was that he had to assume that the laminations steel on hand was of a certain kind. If the steel was not of the type assumed considerable error would be the result. However, it was decided to take the risk.

The formula is:—

$$N = 1000 \sqrt{\frac{R}{K}}$$

where N = Number of turns
R = Resistance of circuit
K = Constant

The constant K, for square section core of "Stalloy" lamination steel is 575, the secondary winding being wound on top of the primary.

After considerable calculation and resort to the slide rule, the figures arrived at were:—Primary 30 turns; Secondary 600 turns. The guage of wire for the primary was 28, and for the secondary about 40.

In view of the number of turns it was decided that a very small transformer could be constructed, so sundry junk box audio transformers were wrecked in search of

(Continued on page 20)

FEDERAL HEADQUARTERS

CONTAINERS—Recently came the long-awaited news of impending release of sealed containers. Post-Officewards went the headlong rush of eager Hams, great was the joy amongst the multitude throughout the land.

Many the tales of what went into those containers—and what didn't! One RI told us that quite a few containers were packed by Parents or other relatives, of Hams absent in other parts. In went everything in the shack, transmitter, receivers, QSL's, log books, even items of clothing!

LICENCES — Most Hams will by now have filled in and returned the application forms for renewal of licences. If you have not already done so you should request on the form the return of your old call sign. The official policy is to return pre-war call signs, and this will be facilitated by writing your old call on the application. Money should not be sent with the application, it will only have to be returned, as until the new regulations have been gazetted the Department cannot issue any licences, and consequently cannot accept any fees.

We find that where particulars of technical qualifications are requested on the form, we are supposed to state how long we held our station licences before the war. We must say that this is far from apparent in the phrasing of the question, and it is little wonder that the majority of the forms so far received do not contain that information.

A little more co-operation on the part of the Wireless Branch with the W.I.A. would have saved a good deal of trouble.

REGULATIONS—The new Ham regulations are almost completed and will be gazetted early in November.

We have gained quite a few of the points set out in our post-war set out last month, we have had to concede some points. We think, more—we are sure—the new regulations will be an adavance on those in force in 1939, criticism will no doubt be forthcoming, but we believe the majority will approve.

HANDBOOK — Remember the "Little Grey Book"? The 1939 edition is now withdrawn, and Radio Inspector Peter Dunne has been hard at work writing a new one which will be on sale soon, probably shortly after gazettal of the new regulations. We liked the idea of the original "Handbook for the Guidance of Operators of Experimental Wireless Stations," even if we did not agree with all it contained, and we earnestly recommend that every Ham should buy a copy of the new edition when available. The price will probably be 1/6.

EXAMINATIONS — The Department advises that the next examination for the A.O.C.P. will be held on the first Tuesday in February next, after which the pre-war programme of examinations will be resumed—second Tuesday in April, July, October and January. Full particulars from the Superintendent (Wireless) in your own State.

FREQUENCIES—It seems now that return of our frequencies from the services (and others) will delay our return to full activity. Now don't panic, we think the delay will be only short, but it seems likely that the new regulations will be in force before we get the frequencies.

We want to state quite plainly that we desire the return of all our pre-war bands as soon as reasonably possible, we see no reason why 28, 56 and 112 megacycles should not be returned at once. There seems to be some sort of feeling in the Services that some of our bands should be kept permanently for Service use. This we will not tolerate. The Service "Big Noises" responsible for frequency allocations must realise that the war is over, and that Service use of frequencies on the scale practised over the past six years must be drastically reduced, in fact there seems no justification whatever for allocations in the region of 3-30 megacycles greater than those of 1939. In the VHF, UHF, etc., region, it is, we admit, a different story, but on the other hand there should be ample room there for everybody. We hear that the P.M.G. proposes to replace the present carrier phone lines between Capital Cities with chains of UHF relay stations using Multi-Channel Pulse transmission. We hope the band width requirements are not too great!

And another thing, there are at least 25 broadcast transmitters operating between 7 and 7.3 megacycles. The majority are American and British, two are Australian. These services are now no longer necessary, we look forward to the speedy removal of these stations from our 40 metre band.

FREQUENCY MODULATION—Did you know that the use of FM, Television and Facimile are under the jurisdiction of the Parliamentary Standing Committee of Broadcasting, and that the P.M.G. cannot issue licences for these types of emission without the consent of the Committee?

It is absolutely unthinkable that FM, Television and Facsimile should be barred from Hams in Australia, so we are looking into this matter.

CORRECTION—We regret that the phrasing of the section of our Post-War Plan dealing with qualifications of Class A Licencees made it appear that holders of Commercial Certificates would have to sit for another examination. We hasten to assure you that this is not so. This error showed us two things:—

(a) There are a lot of Hams holding C.O.C.P.'s
(b) They are quite capable of sticking up for their rights.

The Federal Secertary may now come out of hiding.

TWINS.—To Chas. Quin, VK3WQ, Federal Councillor, and Mrs. Quin, twins, one of each. Heartiest of congratulations from FHQ. All doing well, we hear. Call signs have not yet been allotted at the time we go to press.

DIVISIONAL NOTES

NEW SOUTH WALES

Well, the great news arrived that the gear was available for collection. This meant that it would not be very long now before frequencies were allotted and call-signs re-issued. In Sydney, Experimenters were given the opportunity of either collecting their equipment or having it delivered to the Post Office closest to their home. It was felt that more Amateurs would have availed themselves of the opportunity of collecting their gear rather than having to wait to have it delivered as the Institute circular pointed out that transport was at a premium.

There were about 450 containers stored at Asbestos House and only about 130 of that number were collected. The highlight of Friday's performance was the ham who brought along a multimeter to test his 809!

Application forms for Licence are now available and if you haven't yet received one drop a line to the Divisional Secretary. These came to hand much sooner than expected and it is hoped that this also will be a happy omen for the early resumption of transmissions.

The October General Meeting of the Division had to be postponed on account of the Power strike—no auxiliary power supplies being available at Science House. It is hoped to hold this meeting on the first Thursday in November, but this, of course, will depend upon accommodation being obtained.

You are reminded that the November General Meeting of the New South Wales Division will be held on the Fourth Thursday of the month, viz., 22nd, and not the Third Thursday.

——BUSHFIRES EMERGENCY RADIO NETWORK.

This network continues to function at both Young and Dubbo and very good news came to hand during the week that there is an awakening of interest at Wagga. With a change in Shire Clerks it is confidently expected that 2YW and his gang of fellow workers will receive some encouragement.

Young Network have been carying out some extensive tests and a full scale exercise was held on Sunday, October 1. Despite rainy conditions the test was 100 per cent. successful. Two transmitters were out in the field and communication was established with the local broadcasting station, 2LF. In addition, mobile contacts were also made between two cars.

These lads under the guidance of Jim Taylor, VK2TC, have been carrying out extensive tests with various types of aerials in different parts of the shire and results were very interesting.

Now that releases are being made from the Services it is anticipated that it will be possible to rapidly expand this scheme to include Wagga and Coff's Harbor. Before a net can be established, however, it is necessary that there be at least three Amateurs available to form a technical nucleus. It is no use one man trying to form a net, as the initial organisation, building-up equipment, etc., is no mean task.

Another bright aspect of the matter is the comparative ease with which equipment can be obtained these days. The heartaches and broken promises of early days are still remembered.

All enquiries regarding the Bushfires Network should be addressed to Mr. E. Treharne, 65 Lucas Road, Burwood.

——THE EMERGENCY COMMUNICATION NETWORK

On the 1st October, 1945, the Institute was informed that it had been decided to wind up the Department of National Emergency Services. This meant that the Emergency Communication Network would be no longer required.

Thus ended one of the greatest achievements of Experimental Radio in Australia. From the time war broke out, the New South Wales Division of the Institute was untiring in its efforts to have the Australian Experimenter recognised by giving him a part in the defence of the homeland. Many times success was close, but always at the last moment a hitch occurred, until July, 1942, the news was received that, under the auspices of the State War Effort Co-ordination Committee, a net was to be established.

In the next issue of the magazine, the full story will be told, and as censorship has been lifted, this will be the first time that it has appeared in detail.

As Deputy Controller Wireless, I would like to take this opportunity of expresing my gratitude to all those Operators, both Amateur and non-amateur, who gave so much of their time to make the Network the outstanding success that it was. Their unswerving loyalty — and there must have been times when some decisions could have been considered harsh and difficult—was an inspiration to me and made an onerous task comparatively easy.

It is extremely difficult to pick out any individual as teamwork was the underlying factor, but I must thank Mr. Ray Priddle, VK2RA, particularly for his valued help and assistance.

—WAL RYAN, VK2TI.

VICTORIA

The monthly meeting of the Victorian Division was held at the Division's Rooms on Tuesday, October 2nd, some 60 members and visitors being present. Amongst the visitors were Messrs. C. Tilbrook, VK5GL, Alan Joscelyne, VK2AJO, and Eric Machen from VK6.

Discussion at first cantered around the questions of "when are we likely to get back our gear?" and more important, "when are we likely to get back on the air?" The Federal Secretary, who was present at the meeting, gave the most up-to-date information available, and, whilst nothing definite could be said, it was apparent to all that the period of waiting would probably be much less than the many months most of us had expected.

Mr. H. Love, one of our oldest members (I mean length of membership—not age) who has been very busy during the last few years making receivers and other equipment for the services had agreed to give us a talk on developments in "Permatune Tuning" and also a demonstration of the equipment he and his staff had evolved at Kingsley Radio. Mr. Love first spoke on the general aspects of the subject and was followed by Mr. Bremner, who discussed the technical aspects of the matter. Mr. Bennett then followed with a brief outline of the chemical problems associated with the production of the fine iron particles used in the cores, etc., and finally Mr. Ray Cranch gave some details of the problems involved in the actual production of the coils and other components. A receiver using permeability tuning was demonstrated and, apart from the ease of tuning, the fine tone obtained was very noticeable. Mr. Love and his colleagues were enthusiastically thanked for a particularly enjoyable "show." The subject matter of their talks was so interesting that it is to be hoped they can be persuaded to write it up for "Amateur Radio" for the benefit of those members unable to attend the meeting.

Following the above talk and demonstration, the Chairman, Mr. Kinnear, informed the meeting of a fine gesture by Mr. Love. He stated that Mr. Love had offered, "just for old time sake," to present to the Victorian Division of the W.I.A. one of the AR7 receivers which his company had developed and produced for the services. This offer was naturally greeted with much enthusiasm, and this Division very sincerely thanks Mr. Love for his generous gesture.

At the Council meeting held on October 9th, considerable consideration was given to the technical services which could be provided by the Institute in the best interests of members. It was suggested that standard, or near standard, frequency transmissions would be of great value and the Laboratory Committee was requested to submit a report on the possibility of providing such service for all amateur hands when these bands are again open for our use.

George (Tim) Wells, VK3TW, has informed us that the Western Zone intends to hold a convention at Hamilton, on Saturday, November 17. The intention is to reform the Zone and endeavour to have a working organisation in the zone. There are many things to discuss, and suggestions are invited for the agenda. It is hoped there will be a good roll up of Hams in that district, and any from other zones who may be able to get along. If any one intends to attend the convention, would they contact George Wells, VK3TW, Hamilton.

It is pleasing to note the large number of applications for membership, these have come in at a great rate during the past month. Interest is also being shown in the probable re-starting of the A.O.C.P. Classes, although it may be several months before these can be properly organised.

Once again we extend an invitation to members to bring along non-member friends to meetings; we feel that once having come along they will wish to become part of the organisation. Finally, don't forget the next meeting is the night AFTER Cup night, that is, Wednesday, November 7th.

——THE LABORATORY COMMITTEE

As a result of appeals for more members to join the Laboratory Committee, Ron Higginbotham, VK3RN, and Harold Webber, VK3PW, intimated their willingness to assist to their fullest extent. This is encouraging, but the Committee is still in need of more members if the objects as set out in last month's "A.R." are to be realised. Readers comments and criticisms on these would be welcome, by the way. After all, it is for the advantage of all members that we are making these efforts and concerted action by many members can produce results that would be unattainable if left to only a few.

At the Committee meeting on October 16, special consideartion was given to the direction of Council that a report on the suggestion to operate frequency "Marker" stations on all Ham Bands be prepared. Several suggestions by various members were discussed and it is expected that the report will be available for consideration at the next Council Meeting. Doubtless, many readers will have their own ideas on this subject and their comments and suggestions are invited.

After trying for almost twelve months ,our efforts to dispose of the remaining laboratory equipment has been successful. The G.R. Capacity Bridge, Precision Condenser and Beat Frequency Oscillator have been sold to the Rola Co. for a total of £100. The age of the B.F.O. can be gauged from the fact it uses four 201A's, and the offer of £10 is regarded as highly satisfactory. The GR Capacity Bridge used in conjunction with the Precision Condenser provides a highly accurate means of measuring capacities from a few micro-microfarads to 0.0015 microfarad, the maximum capacity of the condenser (high capacities may be measured, but the process is lengthy an dsomewhat involved calculations required) so that its unsuitability for our purpose is quite apparent. This £100 brings the total of the funds set aside for the rehabilitation of the Laboratory to £205. Probably the first of the proposed equipment for the new Laboratory to be purchased will be a Cathode Ray Oscilloscope.

QUEENSLAND

At the last General Meeting a goodly crowd rolled up, a welcome visitord being Arthur Walz, VK4AW, down on a spot of leave. We will be honoured at the next meeting by a visit from representatives of the Radio Inspectors ,and of course everyone is hoping that we may obtain some definite information as to the date of "CQ Day."

The Queensland Division of the Institute has now firmly found its feet, and we are looking forward to a good deal of activity in the way of Field Days, etc., when conditions permit. At the moment of writing I am advised that Amateur Gear has been released from the P.M.G.'s custody, so that will be a happy event for most VK4's.

We would like to extend our congratulations to the Magazine Committee for their fine job in producing the new "Amateur Radio."

4KS.—Had a few of the local gang out on a recent Sunday helping him to erect a new antenna. I believe its to be a 3 element beam.

4JU—Looking around for a heavy truck to collect his gear fro mthe P.M.G. Will be using a beam erected just before the war and which, as yet, has not justified its existence.

4HB—Pleased to see you along at the meeting, Harry.

4VJ—Busy with PA work at the moment ,but will be finding time to lecture on receivers at the October meeting.

4IR—Has been stocking up on test equipment to iron out those post-war bugs.

4RY—Bill is holidaying in the south at present, but expected back soon. Is trying to decide where to erect his shack.

4RF—Fred is cont emplating some work on the ultra highs judging by a couple of bottles he has obtained.

4EN—Eric has been shifting his shack around to accommodate new equipment—also busy winding transformers.

4JP—George will be remembered for high quality phone in pre-war days. Four Juicy Peaches was the call.

4FB—Fred earns a crust repairing watches. While in his shop the other day I had a rag-chew with 4SA.

4HU—Busy on a very compact rig designed to work from an arm chair. This is but the forerunner of bigger and better things later.

4EY—Hoping to see you along one of these times, Eric, OM.

4ES—Is another one on holidays in the south.

4RC—Has been compiling lists of the DX to be heard on 20 mx these nights.

4RT—Just a chance that you might rea dthese notes, John. Hope the health has improved ,and 73's OM.

4ZU is complete with new shack and receiver, but is bothered with mains QRM.

SOUTH AUSTRALIA

Since the last appearance of news from this division in the new "Amateur Radio" events have moved very rapidly in this State as in others.

All hams have been given back their impressed boxes, or rather ben given the opportunity to collect them if they can provide the necessary transport, this position has arisen owing to the amount of work the department has for the next few weeks.

However, we were assured that if we were not in a hurry the gear would be delivered as soon as possible.

Another encouraging sign for the future of our art is the growing attendances at the W.I.A. meetings, also the boundles enthusiasm which is plainly evident.

At the last of these meetings we were given a very fine lecture by Mr. Cox of the school of mines staff, on push pull amplification. Mr. Cox dealt very ably and thoroughly with his subject and answered some very searching questions at the conclusion of the lecture.

Good response has been received to the offer of A.O. P.C. clases, and it is hoped to start on this project before the end of October providing all subscriptions are in hand by that date.

Big business is reported from the printing trade as all hams in this State seem eager to outdo each other in the design of novel QSL cards, which should be quite an array if all the ideas go into practice, and should make VK5 even more attractive to the elusive dx than ever.

The first full size "Amateur Radio" caused quite a stir here, both in the style and setting up, and hearty congratulations are in order for all those who have been responsible for its publication, needless to say we are looking forward eagerly to future editions especially as the membership all over the Commonwealth growing as it is will soon be reflected in an even better publication.

It is very pleasing to see our service personnel returning to the ranks of civilians again, and amongst the many who are back are F/Lt. Alan Heath, VK5ZX, S/Ldr. L. A. Deane, VK5LD, Sgt. H. Roberts, VK5MY, W/O J. Bergin, VK5JB, who has recently returned from a prisoner of war camp, F/Sgt. J. T. Kilgariff, VK5JT, and F/Lt. R. Turner, VK5RT.

To be discharged shortly are Sgt. D. Whitburn, VK5BY, S/Ldr. H. M. Brown, VK5MB, F/Lt. Dud Nourse, VK2DQ, was through Adelaide recently and it was a pleasure to renew his acquaintance again. "Dud" has seen many countries since he left Australia, and has acquired a perfect English accent.

Letters have been received from W/O Ray Deane, VK5RK, and Sgt. Howard Stacey, VK5XA, both of whom are on Labuan Island, to those of you who may have returned and been missed in these notes, please let us hear from you at So. Aust Headquarters soon.

At the time of writing these notes the Institute has received its 100th application for membership. Considering that this Division has only been reformed since July of this year, the Council feel that their efforts have been highly successful.

The greater the membership the more weight we can wield in your favour. We are pleased to receive applications for membership from anybody who is interested in Radio, so write in to the Secretary, who will be only too pleased to forward an application form for membership. The next meeting of the Institute is to be held on November 13, at 17 Waymouth Street, when a lecture will be given by Mr. Al. Smythe on "The Construction of a Ham Transmitter."

This lecture will be of immense interest to those hams who gained their tickets just prior to the war and to all those contemplating acquiring an amateur ticket in the near future.

TASMANIA

The monthly meeting of this Division was held on Wednesday, October 3rd, at the Photographic Society's Rooms, over Coleman's Chemists (free advt.—Ed.), Liverpool Street, Hobart. This meeting was preceeded by a brief Council Meeting.

The muster was fair but it is hoped that as we settle down to business in earnest there will be a still better response.

The important business of the evening was matters from FHQ relating to proposed regulations and classification recommendations for the P.M.G.'s Department. These came in for quite a gruelling, and generalising it seems that the main beliefs are that the Department will give us plenty of control without us making too exacting restrictions for ourselves. The classification of licences is too odious of class distinction and that the vigilance committee should be in a position to hold the qualified amateur in proper control.

It was also decided to ask that the amateur licence cover any number of receivers and transmitters as it did previously.

Some alterations were made to our "Articles of Association" to make them more straight forward, and fees were reviewed and set back to their old scale of £1/1/- Full City Member, with 10/6 Associate and 5/- Student. Country Members to be 10/6; 7/6 and 5/- respectively. A permanent quarters is still hoped for and some suggestions are to be looked into on the matter.

Other suggestions for arousing interest in the meetings were put forward by the President, VK7LJ, and some discussions were had on post-war prospects, etc. Of course, the old Ham spirit predominated the latter part of the meeting.

Nominations are still coming in and there are hopes of a greater increase now that the preliminaries are over and we are open to general membership.

It was pleasing to see VK7AH present, although he was not fully recovered from his bout of 'flu, he hopes to become active again once things are clear. Being 78 he will possibly need a little helping hand to put some gear into working order, but he is assured of this.

Regret was expresed at the accident in which Chas. Oldham, VK7XA, was involved. He had an altercation with a lorry, his steed being an Austin, results, a couple of broken ribs, and a few days in hospital. History doesn't relate what happened to the "Baby" apart from it being bowled about a bit. We wish you a quick recovery, Chas.

The notification from the P.M.G.'s Department re the return of gear will be welcomed by all concerned, and a general rush has been made to recover and inspect same. It certainly looks good to run through the old familiar parts, and we hope it will not be long before we can energise some of it.

The when and where, are we going to start ,and what class of gear we desire first are now the uppermost thoughts of most of us.

Next meeting is set down as a Special General Meeting for the 7th November, at the address previously stated and all interested are invited to attend.

WESTERN AUST. DIVISION

Postal Address : BOX N1002, G.P.O. PERTH.

Secretary : C. QUIN, VK6CX.

THE DESIGN OF COMPRESSED HIGH FREQUENCY BEAMS

(Continued from page 4).

junction with the former point, these two factors seemed approximately to compensate for the reduced size of the aerial.

As a receiver the compressed diople may not show up quite so well, since the improved impedance matching will not hold over any wide band of wave lengths. Attempts to confirm this by reception tests over a period indicated that in general signals were noticeably but not seriously weaker than from a full length dipole, but that when it was possible to tune the aerial exactly to the wanted signals, the difference largely disappeared. A simple and apparently effective method for tuning the aerial was evolved, and is of particular assistance in tuning loaded reflectors, as will be mentioned later. It consisted in joining a small variable condenser across a few turns near the centre of the loading inductance. In the case of the five-metre band, the feeder cable was tapped across two turns of the coil, and a 15 m-mfd. condenser across four turns, as sketched in Fig 2 (d). This enabled the aerial to be tuned over some two megacycles, and was a decided assistance in reception.

From the foregoing information a number of suggestions should present themselves, for the continuation of this work.

Small air condensers shunted across a few turns in all elements should permit resonance at the required frequencies to obtain satisfactory front to back ratios—a very positive means of adjustment.

I am sure the Magazine Editor would be glad to publish reports of work done on this type of radiator when hams are again in a position to exchange ideas and results.

A RIBBON MICROPHONE.

(Continued from page 15).

suitable laminations. The final transformer measured 1 inch x 1¼ inches allowing ⅛ inch winding space. This proved ample.

The core was ¼ inch square section. Naturally considerable filing was necessary to acquire an even lamination. The easiest way was to clamp the required number of laminations together in the vyce and work on them all at once.

The bobbin on which the windings were wound was made by wrapping brown paper around a ¼ inch square piece of wood using an adhesive to fix the paper together. End pieces were cut from thin card and glued on the ends of the required length of former. After winding on the required number of turns the whole winding was dipped in hot wax allowing time for the wax to soak well into the windings.

The transformer was finished off by bending some strip aluminium to form a channel, and this was clamped all around the laminations. This makes a very neat finish.

ASSEMBLY.

Reference has been made earlier to the "legs." These are two strips of aluminium ⅝ inch wide and 3¼ inches long, serving to mount the transformer as well as the whole microphone assembly on to the base plug. There are two holes drilled in them to correspond to the 3/16 inch hoses on the side of prongs of the magnets.

The two U-shaped magnets are placed together, being careful to place like poles together. ⅛ inch machine screws are used to clamp the pole pieces in place. When doing this be careful to see that the narrow faces of the pole pieces are parallel.

The bridges are now attached to their brackets and fitted into place, a ⅛ inch machine screw through the bend of the magnets holds the brackets in place. The bridges may now be bent so that the face to which the small brass strip is attached is centred on the narrow pole piece face.

The transformer is mounted at one end of the magnet assembly, the end which carries the legs. The transformer will fit here neatly. The ends of the legs can now be bent up so that it can be bolted to the base plug.

One side of the secondary winding is soldered to the centre contact of the microphone connector, the other side of the winding is of course soldered to the frame of the connector.

Now we come to the fitting of the ribbon. After having got the ribbon ready, one end is slipped under the brass strip at one end of the microphone, the clamping screws can be tightened so that the clamp holds the ribbon firmly. The other end of the ribbon is slipped under the brass strip at the other end of the microphone and is pulled up until the ribbon starts to stretch. The ribbon can now be centred and the screws tightened. Returning to the other end, the clamping screws are loosened off and the ribbon centred, keeping the ribbon stretched. When centred these screws are tightened, and the job of fitting the ribbon is finished. The two ends of the primary winding are soldered direct to the brass clamping strips. These strips by the way, are well polished to ensure good contact to the ribbon.

The asesmbly is finished off by covering the whole unit with a bag made from fine silk. This will prevent the moisture from the breath attaching itself to the ribbon. This silk could ,of course, be fixed inside the case, as is done with speakers.

PERFORMANCE.

In the initial testing stages some hum was experienced, due to the transformers; however, the usual methods of turning the transformer round and shifting it to another spot on the chassis soon cleared up the trouble.

To date no frequency curves have been run on the microphone, but to the ear its response appears to be excellent. The pick-up also is good, having the usual figure eight patern of this type of microphone.

The output is low, lower than the commercially manufactured article of the same type, however two stages of high gain pre-amplification were all that was necessary to obtain full output.

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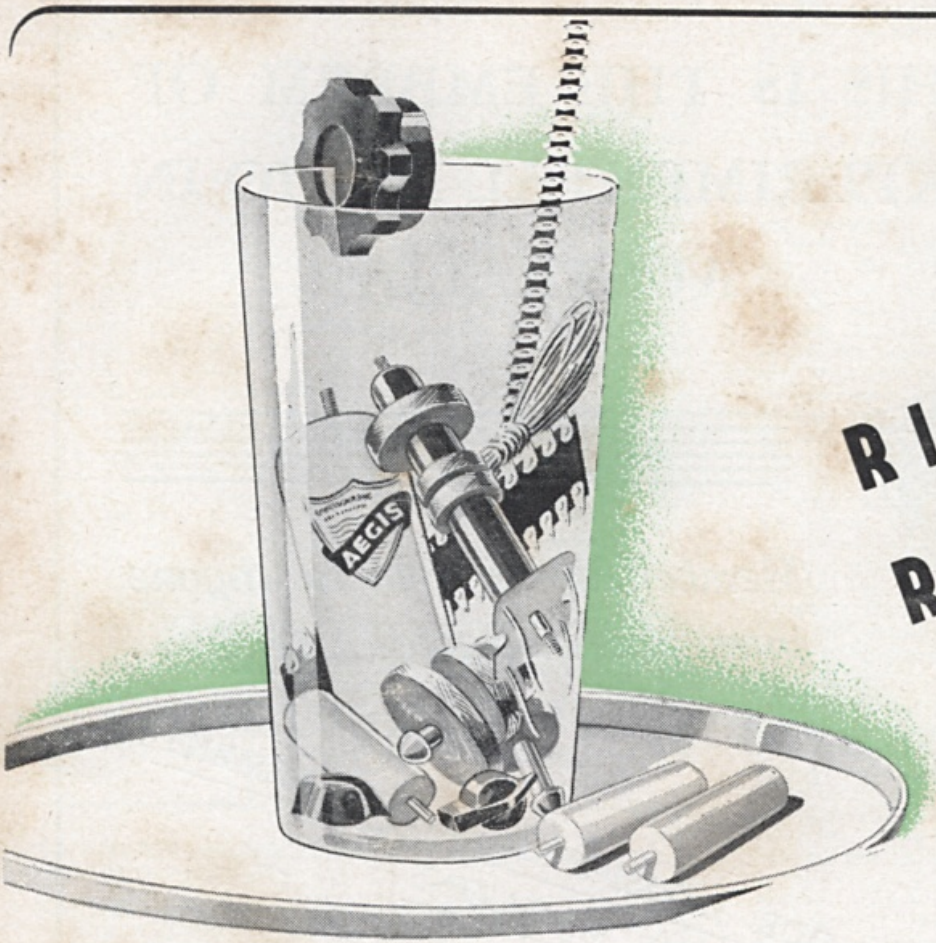

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